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NOTICE OF ALLOWANCE AND FEE(S) DUE

21874 7590 03/16/2004
EDWARDS & ANGELL, LLP
P.O. BOX 55874
BOSTON, MA 02205

EXAMINER	
STOCK JR, GORDON J	
ART UNIT	PAPER NUMBER
2877	
DATE MAILED: 03/16/2004	

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/772,325	01/29/2001	Atsushi Dohi	7055155554	8692

TITLE OF INVENTION: METHOD AND DEVICE FOR MEASURING THICKNESS OF LIQUID CRYSTAL LAYER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$300	\$1630	06/16/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

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B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

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B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

- ☐ Applicant claims SMALL ENTITY status.
See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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Complete and send this form, together with applicable fee(s), to: Mail

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(703) 746-4000**

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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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21874 7590 03/16/2004

**EDWARDS & ANGELL, LLP
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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

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nonprovisional	NO	\$1330	\$300	\$1630	06/16/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
STOCK JR, GORDON J	2877	356-364000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1	_____
2	_____
3	_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent); ☐ individual ☐ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

- ☐ Issue Fee
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- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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(Authorized Signature)

(Date)

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.**

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21874	7590	03/16/2004	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			STOCK JR, GORDON J	
			ART UNIT	PAPER NUMBER
			2877	

DATE MAILED: 03/16/2004

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 226 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 226 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

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Notice of Allowability	Application No.	Applicant(s)	
	09/772,325	DOHI, ATSUSHI	
	Examiner	Art Unit	
	Gordon J Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment received 20 February 2004.
2. ☒ The allowed claim(s) is/are 1-25 and 27-33.
3. ☒ The drawings filed on 2/20/04 (replacement for Figs. 1 and 2) are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with the attorney, Mr. Peter Manus, on March 4, 2004. Specifically, the following claims are amended to obviate possible lack of antecedent basis objections and to correct any grammatical and typographical errors.

Claim 26 and claim 34 are cancelled (see *Election/Restrictions* below).

The amended claims showing corrections are:

5. (currently amended) The method of measuring a thickness according to claim 1, wherein [a] the transmission axis of said first polarizing means and a transmission axis of said second polarizing means are orthogonal to each other.

6. (currently amended) The method of measuring a thickness according to claim 1, wherein [a] the transmission axis of said first polarizing means and a transmission axis of said second polarizing means are parallel to each other.

10. (currently amended) A device for measuring a thickness d of a liquid crystal layer of a device, comprising:

Art Unit: 2877

a light source;

a first polarizing means having a transmission axis for transmitting light from said light source;

a second polarizing means for transmitting reflected light reflected at a reflection region of [an object to be measured] the liquid crystal layer;

a light-receiving means for receiving said reflected light transmitted through said second polarizing means;

a dispersing means for spectrally resolving the reflected light received by said light-receiving means to detect a relation between a wavelength λ and a reflected light intensity;

a wavelength deriving means for finding a wavelength satisfying a polarizing plane-maintaining condition in that said reflected light returns from said [object] liquid crystal layer maintaining a same polarizing plane as a polarizing plane at the time of said light entering [the object] said liquid crystal layer, in that a difference in optical path lengths between an ordinary ray and an extraordinary ray of said reflected light is a sum of an integer multiple of the wavelength and a half-wavelength, or an integer multiple of a wavelength;

a $\Delta n \cdot d$ deriving means for finding a reasonable $\Delta n \cdot d$ from the wavelength found by said wavelength deriving means and a known twist angle of said liquid crystal layer to find a relation between the wavelength and $\Delta n \cdot d$ from a plurality of combinations of the wavelength and $\Delta n \cdot d$; and where Δn is the birefringent index of [the] said liquid crystal layer and $\Delta n \cdot d$ is the product of the birefringent index and the thickness of [the] said liquid crystal layer[.];

a thickness deriving means for finding d by assigning a known combination of wavelength λ and Δn to the relation.

11. (currently amended) The device for measuring a thickness according to claim 10, wherein said wavelength deriving means [is performed by finding] finds a value of a wavelength at which said reflected light intensity assumes an extreme value.

14. (currently amended) The device for measuring a thickness according to claim 10, [a] wherein the transmission axis of said first polarizing means and a transmission axis of said second polarizing means are orthogonal to each other.

15. (currently amended) The device for measuring a thickness according to claim 10, wherein [a] the transmission axis of said first polarizing means and a transmission axis of said second polarizing means are parallel to each other.

22. (currently amended) The method of measuring a thickness according to claim 21, wherein in the case that an angle formed by [a] the transmission axis of said first polarizing means and a direction of alignment on an entrance side surface of said liquid crystal layer is assumed to be φ , and that a twist angle of said liquid crystal layer is assumed to be Θ , a reasonable value of $\Delta n \cdot d / \lambda$ is found from an angle φ at which a polarizing plane of said reflected light is maintained and from a known twist angle Θ , to find $\Delta n \cdot d$ at a wavelength λ from an obtained value of $\Delta n \cdot d / \lambda$.

Art Unit: 2877

23. (currently amended) The method of measuring a thickness to claim 19, wherein [a] the transmission axis of said first polarizing means and [a] the transmission axis of said second polarizing means are orthogonal to each other.

24. (currently amended) The method of measuring a thickness according to claim 19, wherein [a] the transmission axis of said first polarizing means and [a] the transmission axis of said second polarizing means are parallel to each other.

27. (currently amended) A device for measuring a thickness d of a liquid crystal layer in a liquid crystal device, comprising:

a monochromatic light source;

a first polarizing means for transmitting light from said monochromatic light source to enter the liquid crystal layer;

a second polarizing means for transmitting reflected light at [an object] said liquid crystal layer to be measured;

a light-receiving means for receiving said reflected light transmitted through said second polarizing means;

a rotational light-receiving means for receiving light while changing a rotational angle which is an angle formed by said first and second polarizing means and said liquid crystal layer when seen from above, maintaining an angle formed by respective transmission axes of said first polarizing means and said second polarizing means to be constant by engaging with said light receiving means concurrently with said [optical receiving step] light-receiving means;

Art Unit: 2877

an angle deriving means for finding said rotational angle satisfying a polarizing plane-maintaining condition in that said reflected light returns maintaining a same polarizing plane as a polarizing plane at the time of said light entering in that a difference in optical path lengths between an ordinary ray and an extraordinary ray of said reflected light is a sum of an integer multiple of [the] $\frac{1}{2}$ wavelength and a half-wavelength, or an integer multiple of a wavelength;

a $\Delta n \cdot d$ deriving means for finding a relation between a wavelength λ and $\Delta n \cdot d$ from an angle found by said angle deriving means; and

a thickness deriving means for finding the thickness d by using wavelength λ and a known birefringent index Δn of the liquid crystal layer.

28. (currently amended) The device for measuring a thickness according to claim 27, wherein said angle deriving means [is performed by finding] finds a value of said rotational angle at which the intensity of the light reflected at [the object] said liquid crystal layer to be measured assumes an extreme value.

30. (currently amended) The device for measuring a thickness according to claim 29, wherein in the case that an angle formed by [a] the transmission axis of said first polarizing means and a direction of alignment on an entrance side surface of said liquid crystal layer is assumed to be ϕ , and that a twist angle of said liquid crystal layer is assumed to be Θ , a reasonable value of $\Delta n \cdot d / \lambda$ is found from an angle ϕ at which a polarizing plane of said reflected light is maintained and from a known twist angle Θ , to find $\Delta n \cdot d$ at a wavelength λ from an obtained value of $\Delta n \cdot d / \lambda$.

31. (currently amended) The device for measuring a thickness according to claim 27, [a] wherein the transmission axis of said first polarizing means and [a] the transmission axis of said second polarizing means are orthogonal to each other.

32. (currently amended) The device for measuring a thickness according to claim 27, [a] wherein the transmission axis of said first polarizing means and [a] the transmission axis of said second polarizing means are parallel to each other.

33. (currently amended) The device for measuring a thickness according to claim 27, wherein said liquid crystal device is of [the] a reflective type and has a reflection region and wherein said reflection region has a diffusibility and light is received by said light-receiving means at a position off a positive reflection direction corresponding to said light entering.

Election/Restrictions

2. This application is in condition for allowance except for the presence of **claims 26 and 34** to inventions non-elected without traverse. Accordingly, **claims 26 and 34** have been cancelled.

Allowable Subject Matter

3. **Claims 1-25, 27-33** are allowed.

4. The following is an examiner's statement of reasons for allowance:

As to **claim 1**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method of measuring a thickness d of a liquid crystal layer a thickness

Art Unit: 2877

deriving step of finding d by assigning a known combination of wavelength and birefringent index to a relation, in combination with the rest of the limitations of **claims 1-9**.

As to **claim 10**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a device for measuring a thickness a thickness deriving means for finding a thickness by assigning a known combination of wavelength and birefringent index to a relation, in combination with the rest of the limitations of **claims 10-18**.

As to **claim 19**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method of measuring a thickness d of a liquid crystal layer the particular light receiving step and angle deriving step, in combination with the rest of the limitations of **claims 19-25**.

As to **claim 27**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a device for measuring a thickness a monochromatic light source and the particular angle deriving means, in combination with the rest of the limitations of **claims 27-33**.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

Art Unit: 2877

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

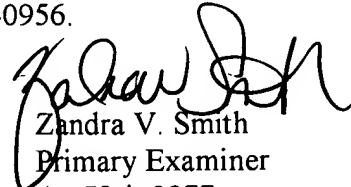
The examiner can normally be reached on Monday-Friday, 8:00 a.m. - 4:30 p.m.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



gs

March 4, 2004



Zandra V. Smith
Primary Examiner
Art Unit 2877